

Atty Docket No.: JCLA4827-CIP

Serial No.: 10/055,157

AS would  
about 100 to about 500 Å, for example, about 200Å, which is about the thickness of the pad oxide 110. The formation method of the thin film 150 is, for example, chemical vapor deposition. Due to the substantially vertical geometry of the sidewalls 145, the thin film 150 deposited on the sidewalls 145 is thinner than that on other positions. As shown in Fig. 1B, while a sputtering step is applied instead of chemical vapor deposition, almost no thin film 150 can be formed on the sidewalls 145.--

Dis-2-11-03  
2:00 PM  
In the Drawings:

Please amend Figs. 1B, 1C, and 1D as shown in the attached sheets, in which the changes are indicted with red ink. Approval of the drawing change is requested.

In The Claim:

Please amend claims 1, 8, 14 and 20 as follows:

- AM
1. (Once Amended) A method for forming a shallow trench isolation structure, comprising the steps of:
    - providing a substrate comprising at least a trench and an active region covered by a mask layer and isolated by the trench;
    - forming an insulation layer to fill the trenches and to cover the mask layer by high density plasma chemical vapor deposition, wherein a surface of the insulation layer is higher than a surface of the substrate and lower than a surface of the mask layer;
    - forming a thin film on the insulation layer;
    - forming a screen layer on the thin film by a fluid precursor;
    - removing the screen layer and the thin film over the active region, while the screen layer and the thin film above the trenches are not removed;
    - removing the insulation layer above the active areas to expose the mask layer, while the screen layer and the thin film above the trench protect the insulation layer in the trench;
    - removing the screen layer to expose the thin film in the trench;

Atty Docket No.: JCLA4827-CIP

Serial No.: 10/055,157

AM  
concl

removing the thin film in the trench to expose the insulation layer; and  
removing the mask layer above the active region.

---

8. (Once Amended) A method for forming a shallow trench isolation structure,  
comprising:

providing a substrate comprising a plurality of trenches and a plurality of active areas,  
wherein the active areas are covered by a pad oxide layer and a mask layer;

forming an insulation layer in the trenches and on the mask layer, wherein the insulation  
layer in the trenches has a surface higher than a surface of the substrate and lower than a surface  
of the mask layer, and wherein the insulation layer on the mask layer has sidewalls;

forming a thin film on the insulation layer above the active areas and the trenches,  
wherein the thin film formed on the sidewalls of the insulation layer is thinner than the thin film  
formed on other positions of the insulation layer;

forming a screen layer on the thin film by a fluid precursor, wherein a thickness of the  
screen layer formed above the active areas is thinner than a thickness of the screen layer formed  
above the trenches;

removing the screen layer and the thin film above the active areas, while the screen layer  
and the thin film above the trenches are not removed;

removing the insulation layer above the active areas, while the screen layer and the thin  
film above the trenches protect the insulation layer in the trench;

removing the screen layer above the trenches;

removing the thin film above the trenches; and

removing the mask layer above the active areas.

---

14. (Once Amended) A method for forming a shallow trench isolation structure,  
applicable to a substrate having at least an active area on the substrate, at least a trench  
surrounding the active area, and a pad oxide layer and a mask layer formed sequentially on the  
substrate in the active area, the method comprising:

AL

Atty Docket No.: JCLA4827-CIP

Serial No.: 10/055,157

forming an insulation layer in the trenches and on the mask layer, wherein the insulation layer in the trench has a thickness ranged between a sum of a depth of the trench and a thickness of the pad oxide and a sum of the depth of the trench plus a thickness of both the mask layer and the pad oxide layer;

forming a thin layer on the insulation layer;

forming a screen layer on the thin layer above the trench;

removing the screen layer and the thin layer above the mask layer and above the active area, while the screen layer and the thin layer above the trench are not removed;

removing the insulation layer above the mask layer and above the active area, while the screen layer and the thin film above the trench protect the insulation layer in the trench;

removing the screen layer above the trench;

removing the thin layer above the trench; and

removing the mask layer above the active area.

20. (Once Amended) The method of claim 14, wherein the insulation layer is formed with a sidewall by controlling an etching/deposition ratio of a high density plasma chemical vapor deposition step.